# ECE 2210
**Electrical Engineering for Nonmajors**
**Spring 2021 Class Syllabus**

Instructor:  Arn Stolp
  Office:  I don't expect to use my office or office phone: MEB 2262,  (801) 581-4205
  Phone:  **(801) 657-7766  <u>Always</u> text first & start text with "ECE 2210".**  This is the best way to contact me.  I may call back from (385) 429-3439 (a google voice number).  Do not initiate contact on the 385 number.
  E-mail:  arnstolp@ece.utah.edu.  I don't check my e-mail as often as I should, so text me if you send me email that I need to read.
  Office hours:  My "office hours" are the Zoom sessions and Monday problem sessions at class time 9:40 to 10:30 M, W, & F.  Also, 11:50 to 12:50  W & F.  Otherwise, text me.  Start text with "ECE 2210" and your question.
  DO NOT send messages via Canvas.  I don't have the time to monitor them.

Web Site:  http://www.ece.utah.edu/~ece2210/

Required books and lab supplies:
  <u>Practical Electronics for Inventors</u>, 3$^{rd}$ or 4$^{th}$ Ed, by Paul Scherz

Prerequisites:  MATH 2250 and PHYCS 2220

## Introduction:

In case you haven't noticed, you're surrounded by electrical and electronic devices.  Electrical motion, measurement and control are powerful and cheap, so they're used everywhere and are part of every technical career, including yours.  Maybe you can find a job where other people make all the decisions concerning wiring, power distribution, electric motors, communications systems, instrumentation, and control; but do you *really want* that?  Do you really *want* to be the clueless one?

ECE 2210 will introduce you to some of the basics of electrical engineering.  This may not seem important now, but I think you will find these concepts very useful in your future classes and jobs.  Besides, they'll help you pass the FE exam, and that should be of immediate concern.

I teach concepts and the use of those concepts to solve problems, not formulas and memorization.  The hands-down easiest way get a good grade in this class is to learn those concepts.

## The Class:

I plan to teach most, if not all, of the class this semester as a "flipped" class.
**Lectures:** Watch video lectures before the Zoom session on the same subject.
  Lectures set the direction and tone of the class and cover more than the written material.  You will be held accountable for everything discussed in the lectures, so watching on schedule is important.  I will link to them in Canvas "assignments".  The lectures are also available at: ece.utah.edu/~ece2210/ECE2210lect_S21.html .

**Zoom Sessions:** W & F 9:40 -10:30 am  and problem session, M 9:40 -10:30 am
Attendance is a required for at least the first 10 minutes of each session so that I can make class announcements.  I may also cover new material and examples not in the regular video lectures.  These are also problem and review sessions and your primary chance to ask questions and get help, it's highly likely that you will never see me in person this semester.  Together, the video lectures and the Zoom sessions make a "flipped" class.  I intend to record these sessions and publish them on Canvas.

**Textbook:**
The text contains a great deal of practical, useful information beyond the theoretical material we cover in this class.  It should prove to be a good reference.  The reading page numbers are for the 3$^{rd}$ edition (4$^{th}$ edition page may be a little different).

**Notes:**
I've supplemented the textbook with lots of notes and examples which you will download from Canvas or the class web site (http://www.ece.utah.edu/~ece2210/).  You will probably want to print much of this material.  The handouts are designed to be printed on both sides of the pages.  Please conserve paper.

**Homework, homework, and more homework:**                                     100 pts.
I will assign many problems for you to turn in, most of which will come from hand-outs available on Canvas, expect homework at every lecture.  Homework will be your main study tool.  As such, I'll give you all the answers so that you can check your work immediately.  In fact, you'll have to self-correct your homework.  If you can't get the answer, check the web site for corrections, study some more, come to the problem session, or ask for help.

Your homework should be neat and clear and show all your work.  For most problems the grader will simply check to see that you've done it and that your paper shows the enough work to get the answer.  Only a few problems will be checked in greater detail.  You may collaborate with others to learn how to do the homework, but will need to hand in your own work.  Copying or allowing another student to copy your work is considered cheating.

You will probably learn more from doing the homework than any other part of this class.  If you thoroughly understand the homework, you will know what the class is about, and the exams should give you no trouble.

Please scan your homework to a pdf file and turn it in to Canvas by the due date.

**Virtual Handouts:**
To make things a little easier for you, I will group class notes and homework assignments into weekly packets and link to them from Canvas "assignments".  Lab assignments will be linked separately.  All of the "handouts" for, homework, labs, notes, etc. are also available on the class web site; ece.utah.edu/~ece2210/ .

**Midterms:**                                                                    300 pts.

You will take three 50-minute midterms throughout the semester.  They will cover material up to the time of the test.  Exams are normally closed book, closed notes, but will have to be a little different this semester.  More information to come.  My exams are designed to see if you learned concepts and problem solving strategies and whether you can work with them, sometimes in new and different ways.  I want to find out how much you *know*, not how quickly you can find a similar example.  Don't try to memorize specific problems.  Exams also cover what you learn in the labs.

**Final:** Monday, 5/3/21, 8:00 - 10:00 am                                        180 pts.

The final will be comprehensive with greater emphasis on the most recent material. There will be a Zoom review before the exam, listen for details later.

**Labs**:   MEB 2275                                                             70pts.

Due to the severity of covid-19 issues, all labs will be available on line at this time. They will be a combination of zoom videos and simulations.  There will probably be an in-person option as well, pay attention to announcements on canvas.

**Grades:**

|            | Pts  | | % of total | Grade |
|------------|------|-|------------|-------|
| Homework:  | 100  | | > 93       | A     |
| Labs:      | 70   | | 90-93      | A-    |
| Midterms:  | 300  | | 87-90      | B+    |
| Final:     | 180  | | 83-87      | B     |
| Total:     | 650  | | 80-83      | B-    |
|            |      | | 77-80      | C+    |
| Cheating:  | -650 | | 73-77      | C     |
|            |      | | 70-73      | C-    |
|            |      | | 67-70      | D+    |
|            |      | | 63-67      | D     |
|            |      | | 60-63      | D-    |
|            |      | | < 60       | E     |

If you want any deviations from the normal requirements (say credit for work you've done before) you will need to see me before the work would normally be due and get an agreement *in writing*.  You'll need to turn in your copy of the agreement with your final, so I'll remember to grade you properly.

# ECE 2210

A. Stolp

Tentative

01/17/21

## COURSE SCHEDULE

| Week | Date | lect | Topics | Textbook (3rd ed.) |
|---|---|---|---|---|
| | M 01/18 | | Martin Luther King Day | |
| 1 | W 01/20 | 1 | Introduction, Basic electrical units & symbols, Kirchhoff's laws, Switches | Ch1, 2.1-3, 2.17, 3.3 |
| | F 01/22 | 2 | Resistance, Ohm's law, Power, Resistors in parallel & series, Dividers | 2.5-7, 2.11-12, 3.5 |
| 2 | W 01/27 | 3 | Sources, Nodes, Grounds, Branches, Meters, Superposition | 2.10, 2.12-18 |
| | F 01/29 | 4 | Source models, Thevenin & Norton Eq. Circuits, Max power transfer | 2.19 |
| 3 | W 02/03 | 5 | Finish Thevenin & Norton Examples, Networks, Nodal analysis | 2.19, notes |
| | F 02/05 | 6 | Battery types, Charging, Solar | 3.2, 5.6, notes |
| 4 | W 02/10 | 7 | Introduction to AC & Signals | 2.20 |
| | F 02/12 | | Exam 1 | |
| 5 | M 02/15 | | Presidents Day | |
| | W 02/17 | 8 | Capacitors, Inductors | |
| | F 02/19 | 9 | Inductors, Resonance, RL first order transients | 2.24, 3.7, 2.30 |
| 6 | W 02/24 | 10 | First order transients | 2.34 |
| | F 02/26 | 11 | Steady-state Sinusoids, Phasors, & Complex numbers | 2.25-26 |
| 7 | W 03/03 | 12 | Phasors, Impedance, & AC circuits | 2.27 |
| | F 03/05 | 13 | AC circuit examples | 2.29-30 |
| 8 | W 03/10 | | Exam 2 | |
| | F 03/12 | 14 | Filters & Bode plots | |
| 9 | W 03/17 | 15 | Second order transients, Laplace Impedance, Transfer functions | 2.34, notes |
| | F 03/19 | 16 | Second order transients, Time-domain solutions, Initial and final conditions | notes |
| 10 | W 03/24 | 17 | Second order transient examples, Systems | notes |
| | F 03/26 | 18 | Diodes basics, Diodes in DC circuits | 4.2 |
| 11 | W 03/31 | 19 | Diodes in AC circuits, Rectification | 4.2, notes |
| | F 04/02 | | Exam 3 | |
| 12 | W 04/07 | 20 | Transistors, bjt | 4.3, notes |
| | F 04/09 | 21 | Transistors, Switching circuits, MOSFETS | Ch 8 |
| 13 | W 04/14 | 22 | Operational Amplifiers | |
| | F 04/16 | 23 | DC motors, PWM | Ch 14, notes |
| 14 | W 04/21 | 24 | RMS and AC Power | 2.21-22 |
| | F 04/23 | 25 | AC Power, RMS, examples | 2.28, 3.8 |
| 15 | W 04/28 | | Problem Session at normal class time | |
| 16 | M 05/03 | | Final Exam, 8:00am | |

**ECE 2210   Spring 2021   Course Schedule**

# ECE 2210 Spring Semester, 2021

| Week | Month | Mon | Tue | Wed | Thur | Fri |
|---|---|---|---|---|---|---|
| 1 | Jan | 18  Martin Luther King Day | 19 First Day of Spring Classes | 20 First class 2210 | 21 | 22 Last day to add or drop simply Hw1 Sat |
| 2 | | 25 Hw3 | 26 | 27 | 28 | 29 Last day to add or drop 2210 Hw3 Sat |
| 3 | Feb | 1 | 2 Hw4 | 3 | 4 | 5 Hw5 Sat |
| 4 | | 8 | 9 | 10 | 11 | 12 Exam 1 |
| 5 | | 15  Presidents Day | 16 | 17 | 18 | 19 |
| 6 | | 22 | 23 | 24 | 25 | 26 |
| 7 | Mar | 1 | 2 | 3 | 4 | 5 |
| 8 | | 8 | 9 Exam Review | 10 Exam 2 | 11 | 12 |
| 9 | | 15 | 16 | 17 | 18 | 19 |
| 10 | | 22 | 23 | 24 | 25 | 26 |
| 11 | | 29 | 30 | 31 | 1 Exam Review | 2 Exam 3 |
| 12 | April | 5 | 6 | 7 | 8 | 9 |
| 13 | | 12 | 13 | 14 | 15 | 16 |
| 14 | | 19 | 20 | 21 | 22 ME Design Day in Union bldg | 23 Last day to reverse CR/NC 2210 |
| 15 | | 26 | 27 Last Day of Classes | 28 Reading Day ECE 2210 prob ses | 29 | 30 ECE 2210 possible Final Review 4:00 |
| 16 | May | 3 ECE 2210 8:00 | 4 | 5 | 6 Freedom | 7 |

# ECE 2210 Spring Semester, 2021

# MERRILL ENGINEERING BUILDING (BLDG. 064)

## SECOND FLOOR PLAN

north

Checkout Window

Door with card access

Stockroom to buy parts

LAB

Arn's Office (MEB 2262)

ECE office

2480B
2480
2480A
2478
2474
2488
2490
2475
2473
2489
2491
2004P
2004M
100M
2004M
UP
DOWN
2560
2562A
2560A
2505B
2505A
2505
2005H
DOWN
UP
2536
2532
2528
2524
2520
2516
2513
2509
2505E
2005D 2005A
2005D ELEC
2007K
SHAFT
2005G
2298
2296
2294
2285
2288
2282
2286
2284
2290
2292
2280
2276
2002L
DOWN
UP

2460
2458
2456
2454
2452
2565
2565A
2555
2551
2543
2541
2355C
2355B
2005E WOMEN
2005C MEN
CHASE
2275
2002J
2272
2270
2274
2268
2266
2266C

2440
2430
2420
2365
2355A
2355
2265
2264
2266B
2262
2260A
2003
2258
2256
2254
2260
2250
200 2H

2415
2360
2350
2340
2325 CLASSROOM capacity: 50
2305
2259
2255
2235A
2002
2224
2250
2004
2407
2240
COOLER
2238
2236
2234
2232
2230
200 2F
2239
2237
2235
2233
2231
2222
2220
2216
2220-B

2410
2405
2405A
2405B
COOLER
2151B
2151C
2151A
2151
2215A
2215
up
2141
2131
2105
2103
2101
2002C DOWN up

2004A
up
DOWN
2004B
2004R
200C
2007R
2165
2155A
2155
2165
2001H
2001

2196
2196B
2196C
2196D
2180A
2180
2172
2162
2135
2001D
2129
2127
2109
2125
2123
2121
2110
2110A
2110B
2102
2196A
2180C
2180B
2138
2136
2134
2132
2130
2126
2124
2122
2120
2110D
2110C